

ABSTRACT OF THE DISCLOSURE

A novel electrokinetic instability (EKI) micromixer and method takes advantage of the EKI to effect active rapid stirring of confluent microstreams of biomolecules without moving parts or complex microfabrication processes. The EKI is induced using an alternating current (A/C) electric field. Within seconds, the randomly fluctuating, three-dimensional velocity field created by the EKI rapidly and effectively stirs an initially heterogeneous solution and generates a homogeneous solution that is useful in a variety of biochemical and bioanalytical systems. Microfabricated on a glass substrate, the inventive EKI micromixer can be easily and advantageously integrated in molecular diagnostics apparatuses and systems, such as a chip-based "Lab-on-a-Chip" microfluidic device.